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(54) Apparatus and method for controlling sub monitors in a video communication system

(57) An apparatus and a method for controlling a plurality of sub monitors 200 in a video communication system in which the same signal from a host computer 2 or a video tape recording/reproducing device is displayed on screens of the sub monitors and a main monitor 100 to which the sub monitors 200 are connected in series. The control apparatus comprises a plurality of communication devices included respectively in the main and sub monitors 100, 200, for serially transferring control data from a host computer 2 to the main and sub monitors 100, 200 and response data from the main and sub monitors 100, 200 to the host computer 2, and a plurality of microcomputers connected respectively to the communication devices 125, 225, for setting up a corresponding one of the main and sub monitors 100, 200 in response to the control data from the host computer 2 when the control data from the host computer 2 is for the control of the corresponding monitor and transferring the control data from the host computer 2 to the subsequent sub monitor 200 when the control data from the host computer 2 is not for the control of the corresponding monitor. According to the present invention, the host computer 2 can control the plurality of sub monitors 200 using the communication devices therein and a program for the control thereof.

FIG. 4

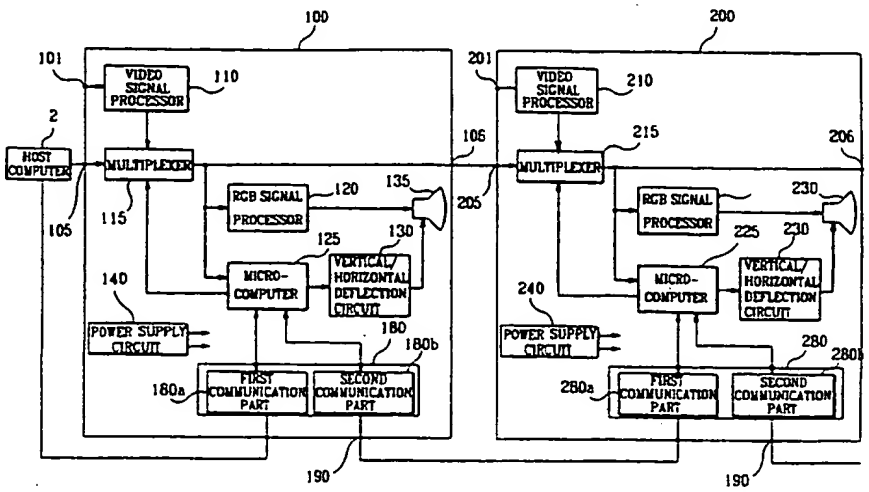

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FIG. 1

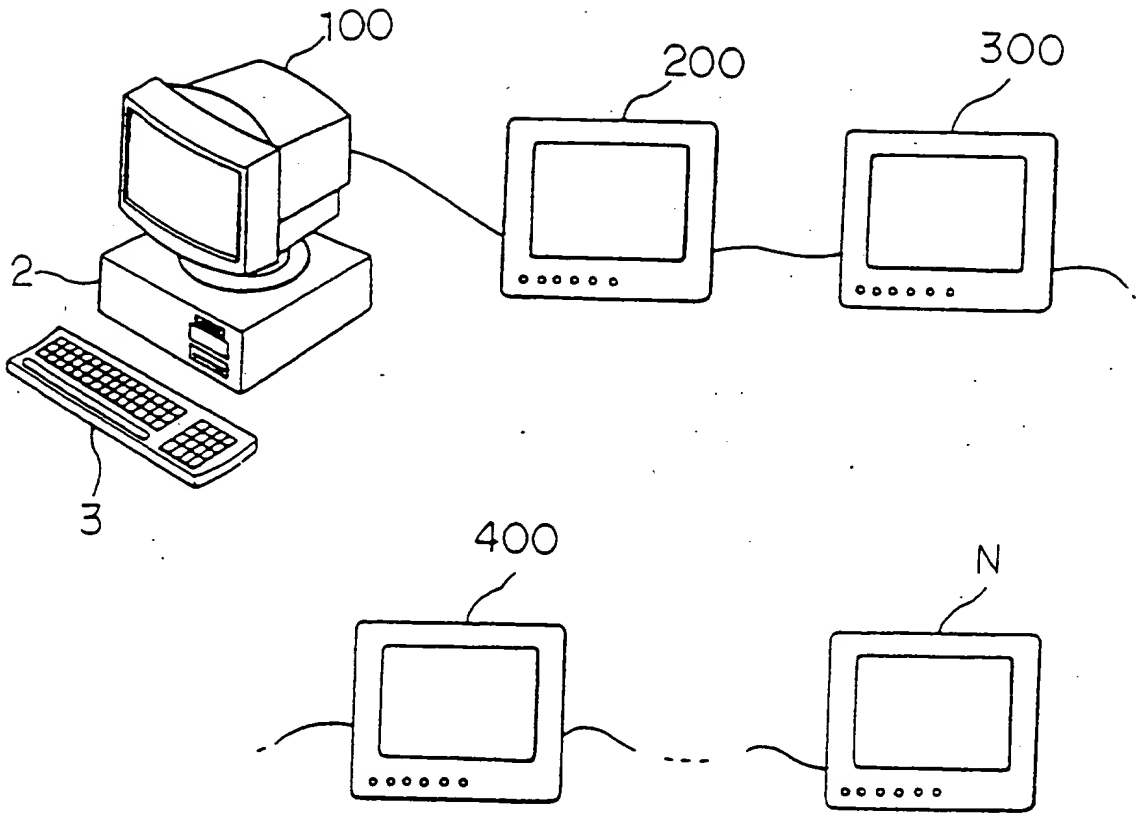


FIG. 2

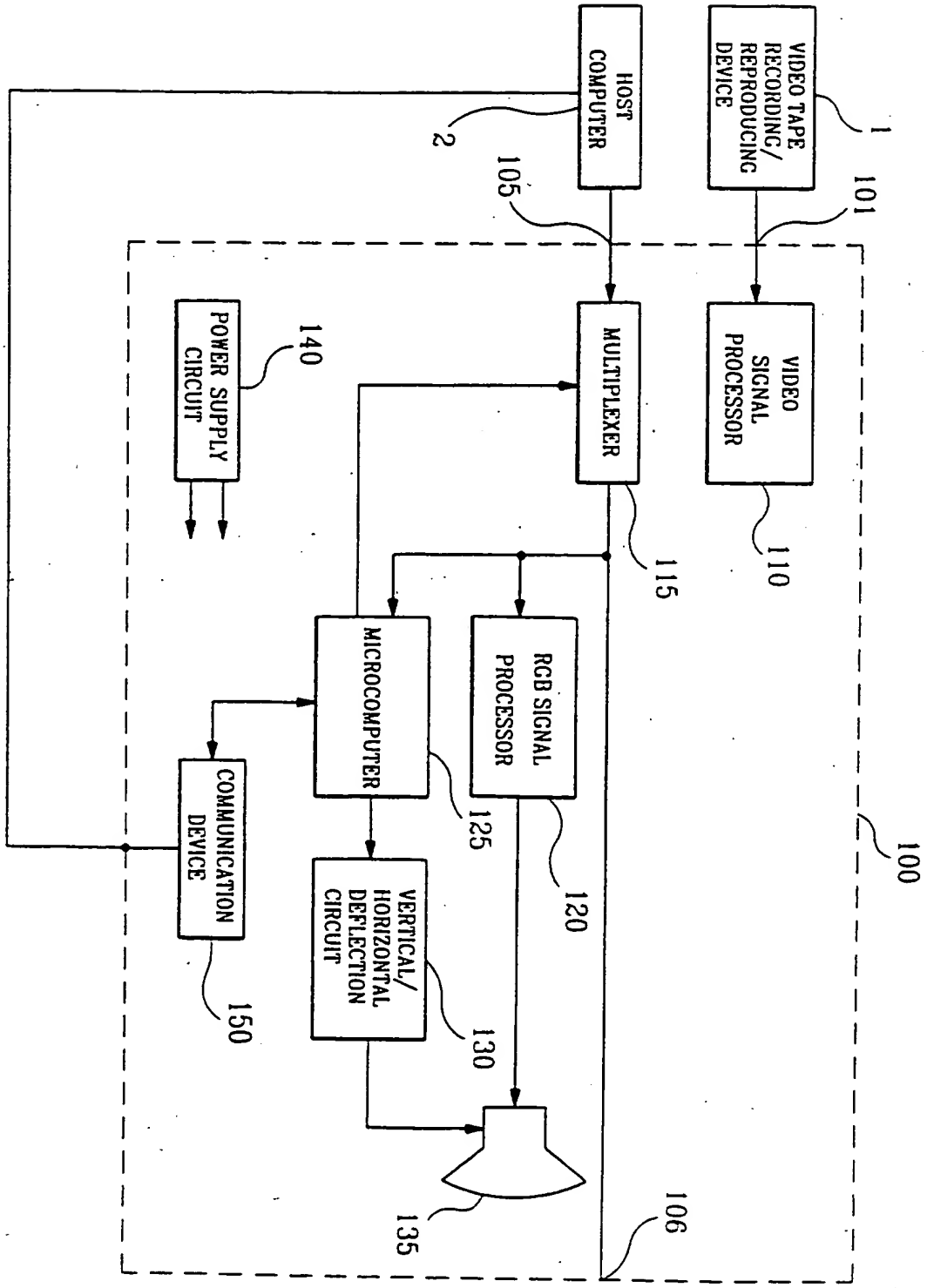


FIG. 3

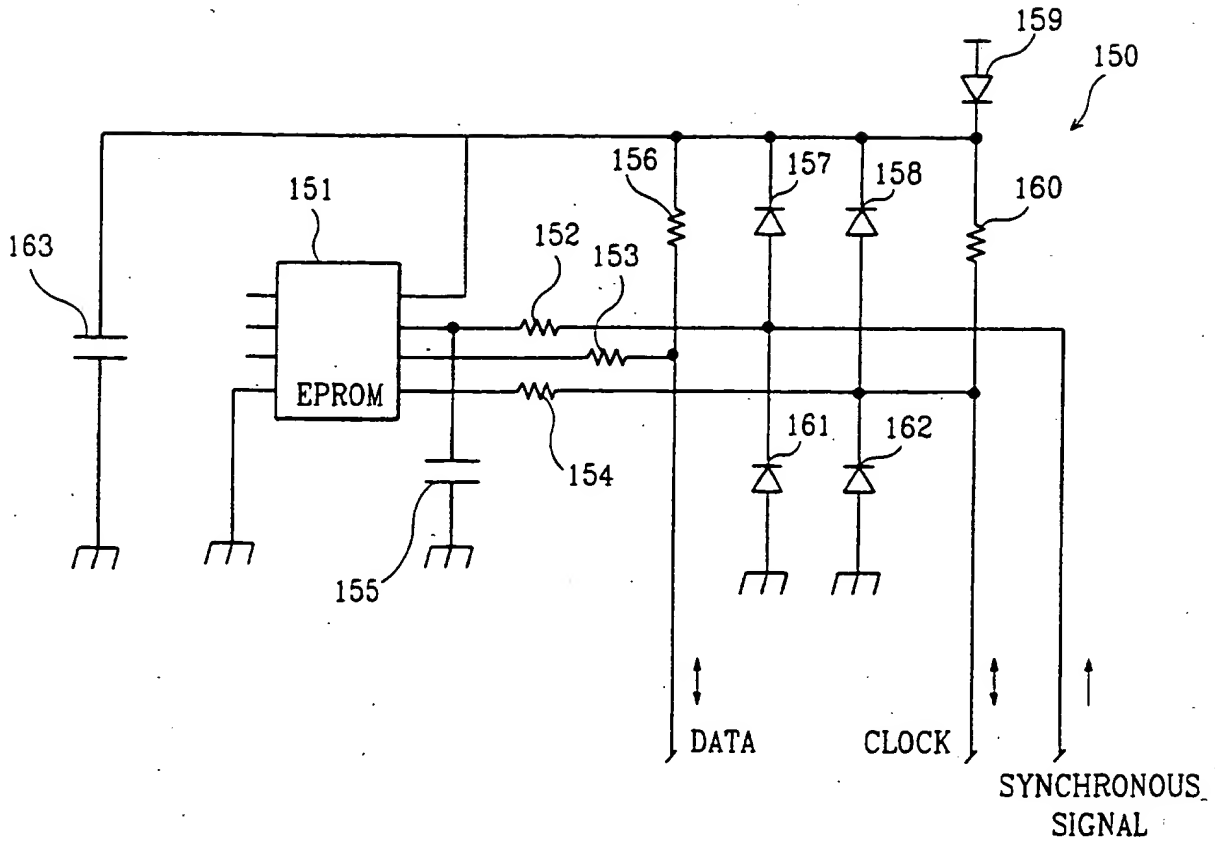


FIG. 4

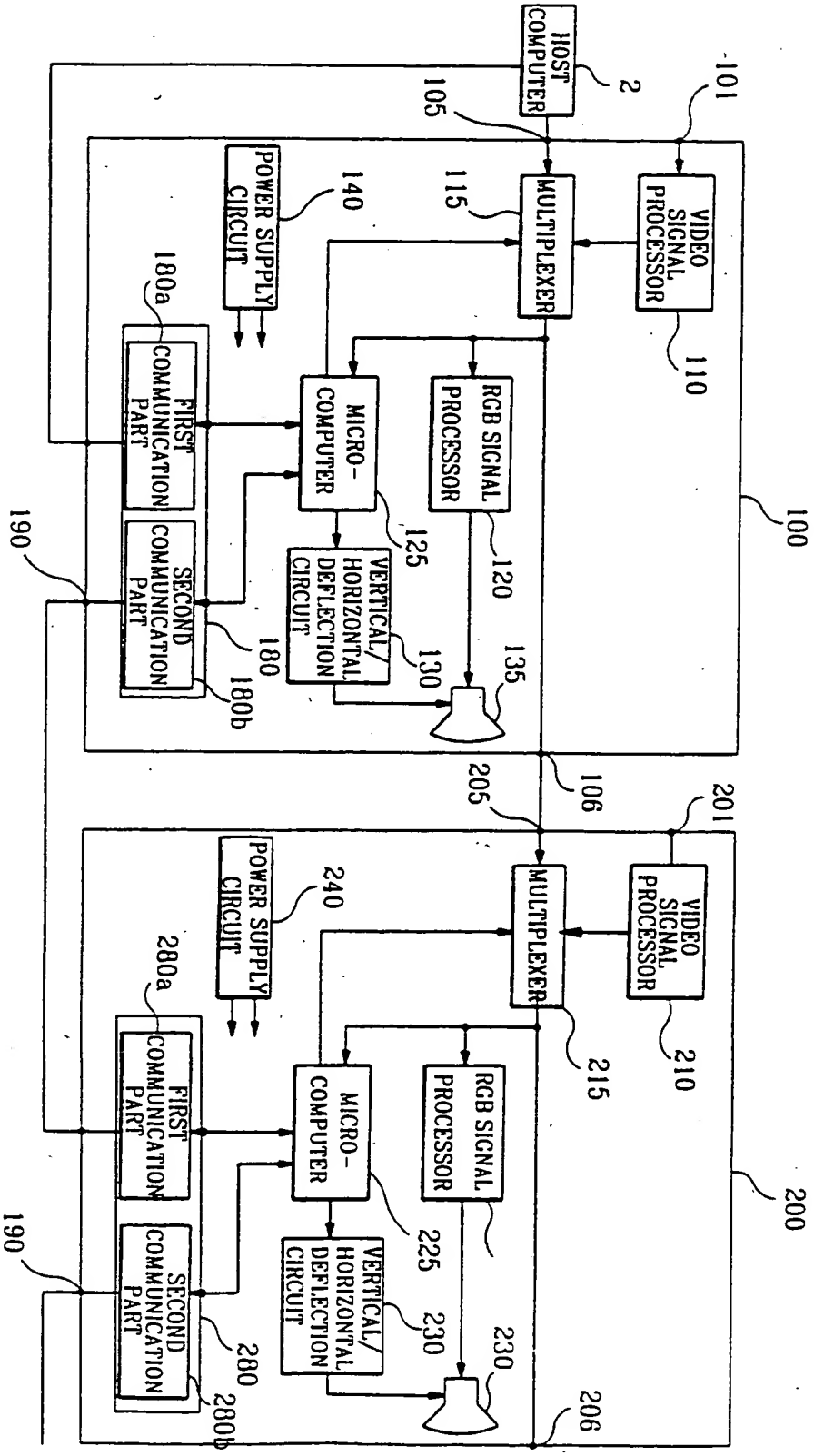


FIG. 5

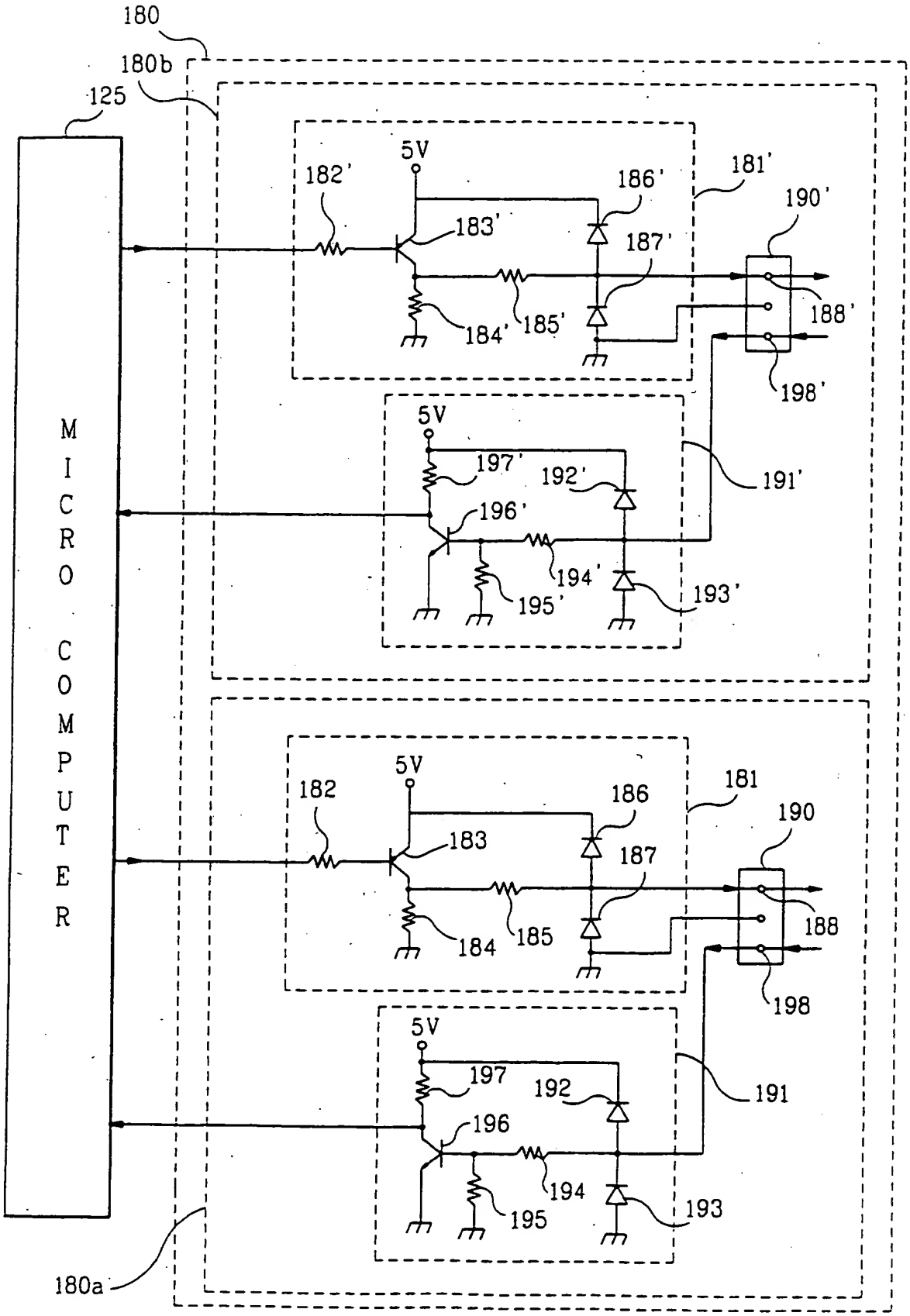


FIG. 6

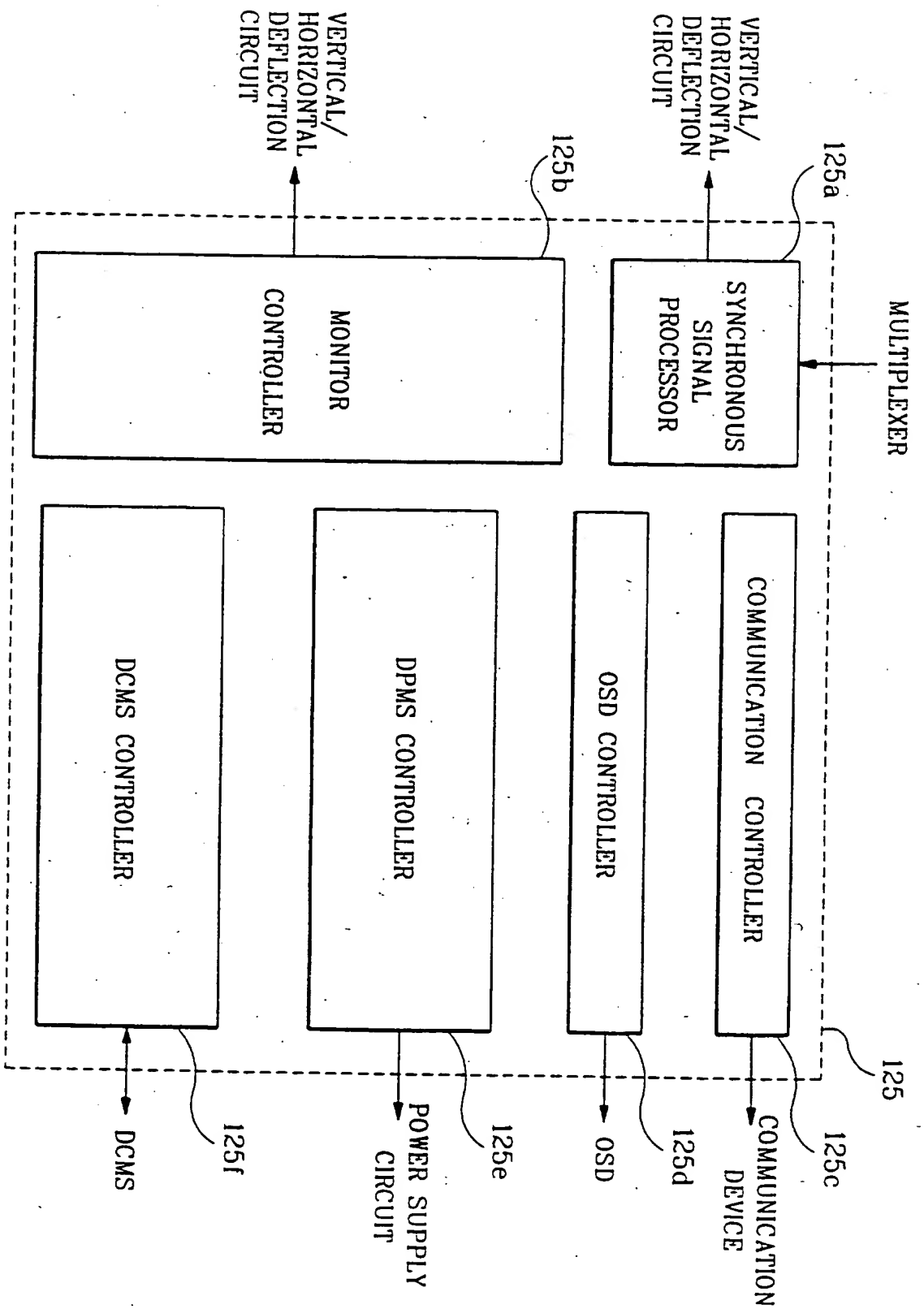
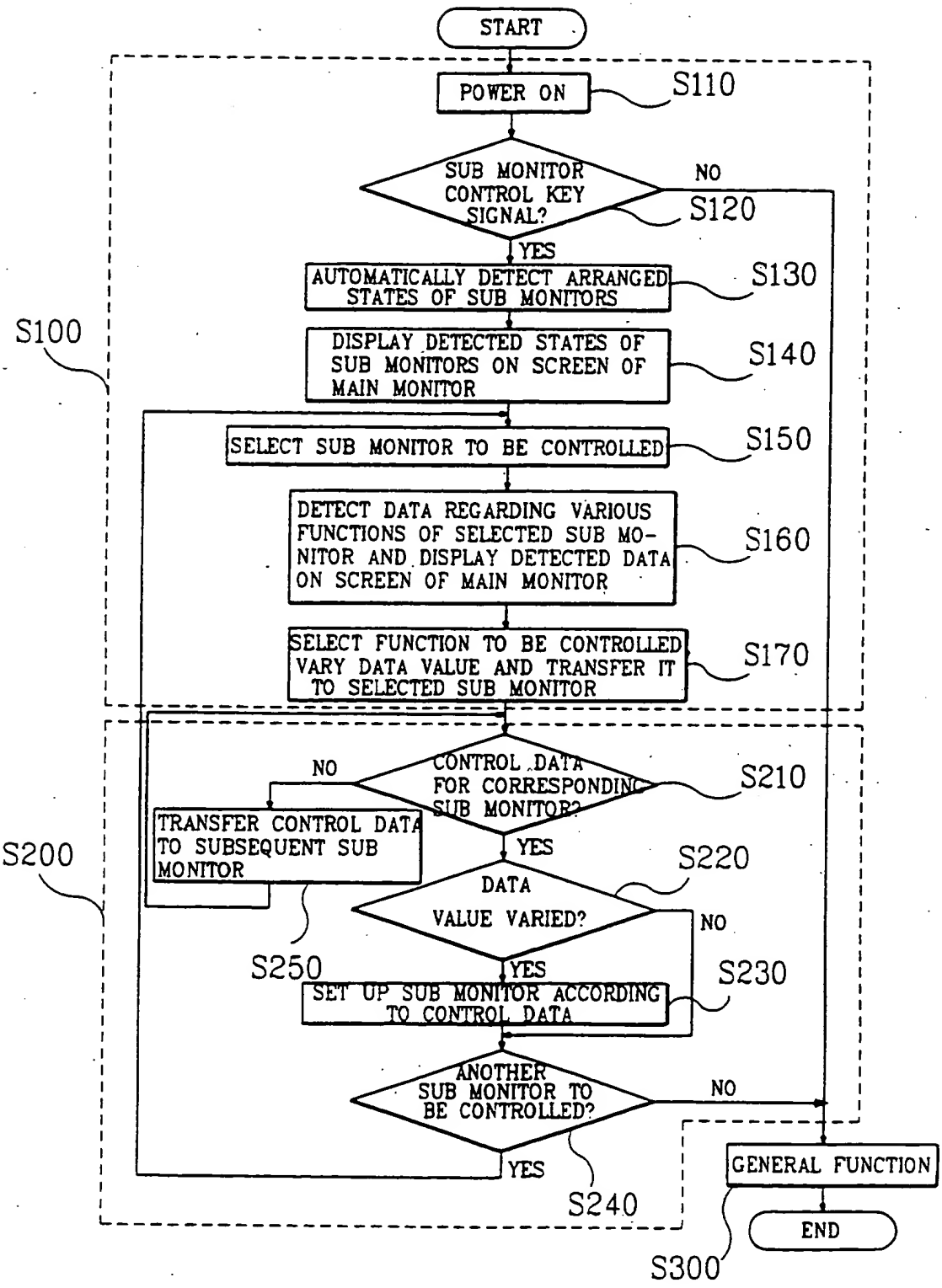


FIG. 7



GENERAL CONTROL	COLOR CONTROL	AUDIO CONTROL	DPMS CONTROL
DEGAUSING SIDE-PIN TRAP PARA H-PHASE V- LIN V- CENTER H- SIZE S- CORRECT	R- GAIN G- GAIN B- GAIN R- CUTOFF G- CUTOFF B- CUTOFF CONTRAST BRIGHT	MAIN-VR BLLANCE BASS TREBLE MUTE	POWER-ON POWER-OFF POWER-STAND BY POWER-SUSPEND

FIG. 8

APPARATUS AND METHOD FOR CONTROLLING SUB MONITORS IN VIDEO COMMUNICATION SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates in general to controlling monitors in a video communication system, and more particularly to an apparatus and a method for controlling a plurality of sub monitors in a video communication system, in which a host computer controls functions of the sub monitors using communication devices therein and a program for the control thereof.

Description of the Prior Art

Generally, a monitor is connected to a television receiver, a video tape recording/reproducing device or a host computer, for processing an output signal therefrom to display it on a screen thereof.

Connected to one monitor may be another monitor for sharing output data from the television receiver, video tape recording/reproducing device or host computer therewith.

Fig. 1 is a block diagram illustrating the construction of a conventional video communication system. As shown in this drawing, a host computer 2 is connected to a main monitor

100, an output terminal of which is connected to an input terminal of a sub monitor 200. An output terminal of the sub monitor 200 is connected to an input terminal of the subsequent sub monitor 300. An output terminal of the last sub monitor N is connected to an input terminal of the main monitor 100. As a result, the same video signal from the host computer 2 is displayed on screens of all the main and sub monitors 100, 200, ..., N so that it can be viewed by the video communication system users. On the other hand, a video tape recording/reproducing device 1 (see Fig. 2) is not limited to the main monitor 100, but it may be connected to any one of the main and sub monitors 100, 200, ..., N so that the same video signal therefrom can be displayed on the screens of all the main and sub monitors 100, 200, ..., N.

Fig. 2 is a block diagram illustrating the construction of the main monitor 100 in Fig. 1. As shown in this drawing, the main monitor 100 comprises a video signal processor 110 for separating a video signal from the video tape recording/reproducing device 1 into red (R), green (G) and blue (B) signals and vertical and horizontal synchronous signals, and a multiplexer 115 for selecting an output signal from the video signal processor 110 or an output signal from the host computer 2 in response to a selection signal.

A microcomputer 125 is adapted to output the selection signal to the multiplexer 115. Also, the microcomputer 125

recognizes a monitor mode in response to the vertical and horizontal synchronous signals from the multiplexer 115 and outputs control signals based on the recognized monitor mode.

An RGB signal processor 120 is adapted to process the RGB signals from the multiplexer 115 to scan them on a cathode ray tube (CRT) 135. A vertical/horizontal deflection circuit 130 is adapted to adjust horizontal position and size, vertical position and size, a side cushion and a tilt of the main monitor 100 in response to the control signals from the microcomputer 125. A communication device 150 is adapted to transfer monitor environment control data from the host computer 2 to the microcomputer 125. The microcomputer 125 sets up the main monitor 100 in response to the transferred monitor environment control data.

The output signal from the multiplexer 115 is also transferred to an input terminal of the sub monitor 200 through an output terminal 106.

Noticeably, the sub monitors 200, ..., N are the same in construction as the main monitor 100, with the exception that they do not comprise the communication device 150. With the above construction, the same video signal is displayed on the screens of all the main and sub monitors 100, 200, ..., N. The reference numeral 140, not described, designates a power supply circuit which converts an external input alternating current (AC) voltage into direct current (DC) voltages of

various levels necessary to the main monitor 100 and supplies the converted DC voltages to the main monitor 100.

Fig. 3 is a detailed circuit diagram illustrating the construction of the communication device 150 in Fig. 2. The communication device 150 is typically composed of a data display channel (DDC).

When the host computer 2 and main monitor 100 are powered on, the communication device 150 transfers various monitor specification data stored in a memory 151 of the monitor 100 to the host computer 2. The host computer 2 transfers control data to the communication device 150 in response to the monitor specification data to control the main monitor 100.

In other words, the communication device 150 performs bidirectional communication between the host computer 2 and the main monitor 100, and the memory 151 of the main monitor 100 stores the contents regarding a monitor resolution, such as synchronous signal frequency values, color coordinates and standard timing.

The construction of the communication device 150 is well known in the art and a detailed description thereof will thus be omitted.

The sub monitors may be used in a conference place. In the case where the conference place is large, conferees have a limitation in viewing data using an overhead projector (OHP). Further, a device with a large screen is high in cost.

For these reasons, the use of personal sub monitors is advantageous in view of the size of the conference place and cost.

However, the above-mentioned conventional video communication system has a disadvantage in that the sub monitor users control their sub monitors individually. Alternatively, provided that a manager is present to manage the video communication system, he will personally check and control many sub monitors. As a result, the video communication system is inconvenient to manage.

SUMMARY OF THE INVENTION

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide an apparatus and a method for controlling a plurality of sub monitors in a video communication system, in which a communication device is provided in each of the sub monitors to perform communication between the corresponding sub monitor and a host computer, and a microcomputer is provided in each of the sub monitors to control the corresponding sub monitor in response to output data from the communication device according to a control program therein, so that the sub monitors can be controlled by the host computer.

In accordance with one aspect of the present invention, there is provided an apparatus for controlling a plurality of sub monitors in a video communication system in which the same signal from a host computer or a video tape recording/reproducing device is displayed on screens of the sub monitors and a main monitor to which the sub monitors are connected in series, comprising a plurality of communication means included respectively in the main and sub monitors, for serially transferring control data from a host computer to the main and sub monitors and response data from the main and sub monitors to the host computer; and a plurality of microcomputers connected respectively to the communication means, for setting up a corresponding one of the main and sub monitors in response to the control data from the host computer when the control data from the host computer is for the control of the corresponding monitor and transferring the control data from the host computer to the subsequent sub monitor when the control data from the host computer is not for the control of the corresponding monitor.

In accordance with another aspect of the present invention, there is provided a method for controlling a plurality of sub monitors in a video communication system in which the same signal from a host computer or a video tape recording/reproducing device is displayed on screens of the sub monitors and a main monitor to which the sub monitors are

connected in series, comprising the first step of checking states of the sub monitors on the screen of the main monitor and transferring control data from the host computer to a desired one of the sub monitors to control it; and the second step of selecting and setting up the desired sub monitor in response to the control data transferred at the first step.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram illustrating the construction of a conventional video communication system;

Fig. 2 is a block diagram illustrating the construction of a main monitor in Fig. 1;

Fig. 3 is a detailed circuit diagram illustrating the construction of a communication device in Fig. 2;

Fig. 4 is a block diagram illustrating the construction of main and sub monitors in accordance with the present invention;

Fig. 5 is a detailed circuit diagram illustrating the construction of a communication device in Fig. 4;

Fig. 6 is a block diagram illustrating the construction

of a microcomputer in Fig. 4;

Fig. 7 is a flowchart illustrating a method for controlling a plurality of sub monitors in a video communication system using a host computer in accordance with the present invention; and

Fig. 8 is a table illustrating control functions of the sub monitors in Fig. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 4 is a block diagram illustrating the construction of main and sub monitors in accordance with the present invention. Some parts in this drawing are the same as those in Fig. 2. Therefore, like reference numerals designate like parts and a detailed description thereof will thus be omitted.

As shown in Fig. 4, the main monitor 100 comprises the video signal processor 110, the multiplexer 115, the RGB signal processor 120, the vertical/horizontal deflection circuit 130 and the power supply circuit 140. The microcomputer 125 is adapted to output the selection signal to the multiplexer 115. Also, the microcomputer 125 recognizes a monitor mode in response to the vertical and horizontal synchronous signals from the multiplexer 115 and outputs control signals based on the recognized monitor mode to the vertical/horizontal deflection circuit 130. Further, the

microcomputer 125 controls the main monitor 100 in response to control data from the host computer 2 and outputs response data to the host computer 2. Also, the microcomputer 125 transfers the control data from the host computer 2 to the sub monitor 200 and response data from the sub monitor 200 to the host computer 2. A communication device 180 is provided with a first communication part 180a for performing communication between the host computer 2 and the microcomputer 125, and a second communication part 180b for performing communication between the microcomputer 125 and the sub monitor 200.

In accordance with the preferred embodiment of the present invention, the sub monitors 200, ..., N are connected in series to the main monitor 100 and the construction thereof is the same as that of the main monitor 100.

Fig. 5 is a detailed circuit diagram illustrating the construction of the communication device 180 in Fig. 4. Preferably, the communication device 180 may be composed of a display communication management system (DCMS).

As shown in Fig. 5, the first communication part 180a includes a first buffer 181 for transferring the response data from the microcomputer 125 to the host computer 2, and a second buffer 191 for transferring the control data from the host computer 2 to the microcomputer 125. The second communication part 180b includes a third buffer 181' for transferring the control data from the microcomputer 125 to

the sub monitor 200, and a fourth buffer 191' for transferring the response data from the sub monitor 200 to the microcomputer 125. A connector 190 has a first output terminal 188 for transferring the response data from the first buffer 181 to the host computer 2, a second output terminal 188' for transferring the control data from the third buffer 181' to the sub monitor 200, a first input terminal 198 for transferring the control data from the host computer 2 to the second buffer 191, and a second input terminal 198' for transferring the response data from the sub monitor 200 to the fourth buffer 191'.

The first buffer 181 includes a current amplification transistor 183, bias/transistor protection diodes 186 and 187 and resistors 182, 184 and 185. The resistor 182 has its one side connected to a first output terminal of the microcomputer 125, the resistor 184 has its one side connected to a ground voltage terminal, and the resistor 185 has its one side connected to the first output terminal 188 of the connector 190. The current amplification transistor 183 has its base connected to the other side of the resistor 182, its emitter connected to a supply voltage terminal of 5V and its collector connected in common to the other sides of the resistors 184 and 185. The bias/transistor protection diode 186 has its anode connected to a connection point of the resistor 185 and the first output terminal 188 of the connector 190 and its

cathode connected to a connection point of the supply voltage terminal and the emitter of the transistor 183. The bias/transistor protection diode 187 has its anode connected to the ground voltage terminal and its cathode connected to the connection point of the resistor 185 and the first output terminal 188 of the connector 190.

The second buffer 182 includes a current amplification transistor 196, bias/transistor protection diodes 192 and 193 and resistors 194, 195 and 197. The resistor 197 has its one side connected to the supply voltage terminal, the resistor 194 has its one side connected to the first input terminal 198 of the connector 190, and the resistor 195 has its one side connected to the ground voltage terminal. The current amplification transistor 196 has its base connected in common to the other sides of the resistors 194 and 195, its emitter connected to the ground voltage terminal and its collector connected in common to the other side of the resistor 197 and a first input terminal of the microcomputer 125. The bias/transistor protection diode 192 has its anode connected to a connection point of the first input terminal 198 of the connector 190 and the resistor 194 and its cathode connected to a connection point of the supply voltage terminal and the collector of the transistor 196. The bias/transistor protection diode 193 has its anode connected to the ground voltage terminal and its cathode connected to the connection

point of the first input terminal 198 of the connector 190 and the resistor 194.

The third buffer 181' includes a current amplification transistor 183', bias/transistor protection diodes 186' and 187' and resistors 182', 184' and 185'. The resistor 182' has its one side connected to a second output terminal of the microcomputer 125, the resistor 184' has its one side connected to the ground voltage terminal, and the resistor 185' has its one side connected to the second output terminal 188' of the connector 190. The current amplification transistor 183' has its base connected to the other side of the resistor 182', its emitter connected to the supply voltage terminal of 5V and its collector connected in common to the other sides of the resistors 184' and 185'. The bias/transistor protection diode 186' has its anode connected to a connection point of the resistor 185' and the second output terminal 188' of the connector 190 and its cathode connected to a connection point of the supply voltage terminal and the emitter of the transistor 183'. The bias/transistor protection diode 187' has its anode connected to the ground voltage terminal and its cathode connected to the connection point of the resistor 185' and the second output terminal 188' of the connector 190.

The fourth buffer 182' includes a current amplification transistor 196', bias/transistor protection diodes 192' and

193' and resistors 194', 195' and 197'. The resistor 197' has its one side connected to the supply voltage terminal, the resistor 194' has its one side connected to the second input terminal 198' of the connector 190, and the resistor 195' has its one side connected to the ground voltage terminal. The current amplification transistor 196' has its base connected in common to the other sides of the resistors 194' and 195', its emitter connected to the ground voltage terminal and its collector connected in common to the other side of the resistor 197' and a second input terminal of the microcomputer 125. The bias/transistor protection diode 192' has its anode connected to a connection point of the second input terminal 198' of the connector 190 and the resistor 194' and its cathode connected to a connection point of the supply voltage terminal and the collector of the transistor 196'. The bias/transistor protection diode 193' has its anode connected to the ground voltage terminal and its cathode connected to the connection point of the second input terminal 198' of the connector 190 and the resistor 194'.

As mentioned above, because the main and sub monitors 100, 200, ..., N are the same in construction, the construction of the communication device 180 in Fig. 5 is similarly applied to all the sub monitors 200, ..., N. The data transfer between the main and sub monitors 100 and 200 will hereinafter be described with reference to Fig. 5.

For example, in the case where the host computer 2 outputs a logical value "0" to the first input terminal 198 of the communication device 180, the transistor 196 in the second buffer 191 is turned off, thereby causing a voltage of 5V from the supply voltage terminal to be applied to the first input terminal of the microcomputer 125.

Then, the microcomputer 125 recognizes the control data from the host computer 2 and thus outputs a logical value "1" to the communication device 180 at its second output terminal, thereby causing the transistor 183' in the third buffer 181' to be turned off. As the transistor 183' in the third buffer 181' is turned off, the logical value "0" is outputted through the second output terminal 188' of the connector 190 to the communication device 280 in the sub monitor 200. As a result, the output logical value "0" from the host computer 2 is transferred to the microcomputer 225 in the sub monitor 200 through the communication device 280.

Then, the response data from the microcomputer 225 in the sub monitor 200 is transferred to the second input terminal 198' of the communication device 180 in the main monitor 100 through the communication device 280 in the sub monitor 200. The fourth buffer 191' transfers the response data at the second input terminal 198' of the connector 190 to the second input terminal of the microcomputer 125. As a result, the microcomputer 125 outputs the received response data to the

first buffer 181 at its first output terminal. The first buffer 181 transfers the response data from the microcomputer 125 to the host computer 2 through the first output terminal 188 of the connector 190.

In this manner, the host computer can individually control the sub monitors in the conference place using the communication devices.

Fig. 6 is a block diagram illustrating the construction of the microcomputer 125 in Fig. 4. As shown in this drawing, the microcomputer 125 includes a synchronous signal processor 125a for processing the vertical and horizontal synchronous signals from the multiplexer 115, a monitor controller 125b for outputting a control signal to the vertical/horizontal deflection circuit 130, a communication controller 125c for outputting a control signal to the communication device 180, an on-screen display (OSD) controller 125d for outputting a control signal to an OSD to generate a character signal, a display power management system (DPMS) controller 125e for outputting a DPMS control signal to the power supply circuit 140, and a DCMS controller 125f for controlling the DCMS.

Fig. 7 is a flowchart illustrating a method for controlling a plurality of sub monitors in a video communication system using the host computer 2 in accordance with the present invention.

First, the monitor power state will be mentioned before

describing the monitor control method. The monitor power off state is not a complete off state but a suspend state. For this reason, the minimum operation power is applied to the microcomputer 125 in the main monitor 100.

Upon receiving a power control signal from the host computer 2 through the communication device 180, the microcomputer 125 controls the power supply circuit 140 to control the entire power of the main monitor 100. The power states of all the sub monitors 200, ..., N are the same as that of the main monitor 100.

A communication device (not shown) of the host computer 2 is connected to the communication device 180 of the main monitor 100 to transfer sub monitor control data from the host computer 2 to the microcomputer 125. Then, the microcomputer 125 transfers the received control data to the communication device 280 of the sub monitor 200 through the communication device 180 of the main monitor 100.

The communication device 280 of the sub monitor 200 transfers the control data from the main monitor 100 to the microcomputer 225 of the sub monitor 200. The microcomputer 225 then transfers the received control data to the communication device of another sub monitor 300, connected in series to the sub monitor 200, through the communication device 280.

In this manner, the data transfer is performed between

the host computer 2 and the sub monitors.

Now, the method for controlling the sub monitors 200, 300, ..., N connected in series to the main monitor 100 using the host computer 2 will be mentioned in detail with reference to Fig. 7.

For example, assume that the host computer 2 will control the power of the sub monitor 200 and the volume of another sub monitor 400. First, when the host computer 2 and main monitor 100 are powered on at step S110, general function and sub monitor control messages are displayed on the screen of the main monitor 100. In this case, the host computer 2 selects the sub monitor control message on the screen of the main monitor 100 under the control of the operator using a keyboard 3 at step S120.

Then, the host computer 2 automatically detects the arranged states of the sub monitors 200, ..., N using the communication devices 180, 280, ... at step S130 and displays the detected states on the screen of the main monitor 100 at step S140.

The host computer 2 selects a desired one (for example, 200) of the sub monitors 200, ..., N displayed on the screen of the main monitor 100 under the control of the operator using the keyboard 3 at step S150. Then, control functions of the selected sub monitor 200 as shown in Fig. 8 are displayed on the screen of the main monitor 100.

In the case where a power control function is selected among the displayed functions, the current power state of the selected sub monitor 200 is displayed on the screen of the main monitor 100 at step S160. Then, the host computer 2 transfers control data to the microcomputer 125 through the communication device 180 of the main monitor 100 under the control of the operator at step S170 to power on the sub monitor 200.

Upon receiving the control data from the host computer 2, the microcomputer 125 checks at step S210 whether the received control data is for the control of the main monitor 100. If it is checked at the above step S210 that the received control data is not for the control of the main monitor 100, the microcomputer 125 transfers the received control data to the communication device 280 of the sub monitor 200 through the communication device 180 at step S250.

The microcomputer 225 in the sub monitor 200 receives the control data from the microcomputer 125 in the main monitor 100 through the communication device 280 and checks at step S210 whether the received control data is for the control of the sub monitor 200. In the case where it is checked at the above step S210 that the received control data is for the control of the sub monitor 200, the microcomputer 225 loads the power state of the sub monitor 200 and transfers the response data to the host computer 2 through the communication

devices 280 and 180. Then, the host computer 2 displays the response data from the microcomputer 225 on the screen of the main monitor 100.

The operator checks the power state of the sub monitor 200 on the OSD and selects the power-on state of the sub monitor 200. Thus, the host computer 2 transfers control data corresponding to the power-on state to the communication device 280 of the sub monitor 200 through the communication device 180 and microcomputer 125 in the main monitor 100 at step S170. The communication device 280 outputs the received control data to the microcomputer 225.

Then, the microcomputer 225 checks at step S220 whether the received control data is different from set-up data. If it is checked at the above step S220 that the received control data is different from the set-up data, the microcomputer 225 controls the power supply circuit 240 in the sub monitor 200 according to the received control data at step S230 to power on the sub monitor 200.

After controlling the power-on function of the sub monitor 200, the host computer 2 checks at step S240 whether another sub monitor to be controlled is present. In the case where it is checked at the above step S240 that the volume of the sub monitor 400 is to be controlled, the host computer 2 selects the sub monitor 400 under the control of the operator using the keyboard 3 at step S150.

The volume of the sub monitor 400 is controlled in the same manner as the power of the sub monitor 200.

Namely, if the operator selects the sub monitor 400 on the screen of the main monitor 100, control functions of the selected sub monitor 400 are displayed on the screen of the main monitor 100 at step S160.

Then, the operator selects a volume control function among the displayed functions to raise or lower the volume of the sub monitor 400. The host computer 2 transfers the corresponding control data to the microcomputer 125 through the communication device 180 of the main monitor 100 under the control of the operator at step S170.

Upon receiving the control data from the host computer 2, the microcomputer 125 checks at step S210 whether the received control data is for the control of the main monitor 100. If it is checked at the above step S210 that the received control data is not for the control of the main monitor 100, the microcomputer 125 transfers the received control data to the communication device 280 of the sub monitor 200 through the communication device 180 at step S250.

The microcomputer 225 in the sub monitor 200 receives the control data from the microcomputer 125 in the main monitor 100 through the communication device 280 and checks at step S210 whether the received control data is for the control of the sub monitor 200. In the case where it is checked at the

above step S210 that the received control data is not for the control of the sub monitor 200, the microcomputer 225 transfers the received control data to the communication device of the sub monitor 300 through the communication device 280 at step S250. In this manner, the control data from the host computer 2 is transferred to the microcomputer of the sub monitor 400, which then sets up the sub monitor 400 again according to the received control data.

In the case where the host computer 2 does not select the sub monitor control message on the screen of the main monitor 100 at step S120 or checks at step S240 that another sub monitor to be controlled is not present, it performs the general function at step S300.

Noticeably, the host computer 2 displays the arranged states, functions and associated data of the sub monitors in an OSD manner. The sub monitors are automatically detected or set to their inherent numbers for the check on the arranged states thereof.

Control reference values of the sub monitors are previously set in a manufacturing process. When the operator selects a desired one of the sub monitors and a control function thereof, the control reference values are displayed on the screen of the main monitor. The operator checks the displayed control reference values and selects a desired one of them. Then, the operator applies the selected value to the

host computer using a computer input unit to control the selected sub monitor. In this manner, the host computer can control all the sub monitors.

The computer input unit may be a keyboard, a mouse and etc.

Fig. 8 is a table illustrating functions of the sub monitors controllable by the host computer 2. As shown in this drawing, the control functions of the sub monitors are classified into general, color, audio and power control functions.

The general control function is to control degaussing, side-pin, trap, horizontal synchronous signal phase H-PHASE, vertical synchronous signal line V-LINE, vertical synchronous signal center V-CENTER, horizontal synchronous signal size H-SIZE and S-correction S-CORRECT.

The color control function is to control RGB gains R-GAIN, G-GAIN and B-GAIN, RGB cutoff R-CUTOFF, G-CUTOFF and B-CUTOFF, contrast and bright.

The audio control function is to control main volume MAIN-VR, balance, bass, treble and mute.

The power control function is to control power-on/off, power-standby and power-suspend.

As mentioned above, because the sub monitors have the communication functions, they can be controlled by the host computer under the control of the operator.

As apparent from the above description, according to the present invention, the host computer can control the plurality of sub monitors using the communication devices therein and the program for the control thereof.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

WHAT IS CLAIMED IS:

1. An apparatus for controlling a plurality of sub monitors in a video communication system in which the same signal from a host computer or a video tape recording/reproducing device is displayed on screens of said sub monitors and a main monitor to which said sub monitors are connected in series, comprising:

a plurality of communication means included respectively in said main and sub monitors, for serially transferring control data from a host computer to said main and sub monitors and response data from said main and sub monitors to said host computer; and

a plurality of microcomputers connected respectively to said communication means, for setting up a corresponding one of said main and sub monitors in response to the control data from said host computer when the control data from said host computer is for the control of the corresponding monitor and transferring the control data from said host computer to the subsequent sub monitor when the control data from said host computer is not for the control of the corresponding monitor.

2. An apparatus for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 1, wherein each of said communication means includes:

first buffering means for transferring the response data from a corresponding one of said microcomputers to said host computer;

second buffering means for transferring the control data from said host computer to the corresponding microcomputer;

third buffering means for transferring the control data from the corresponding microcomputer to the subsequent sub monitor;

fourth buffering means for transferring the response data from the subsequent sub monitor to the corresponding microcomputer; and

a connector having a first output terminal for transferring the response data from said first buffering means to said host computer, a second output terminal for transferring the control data from said third buffering means to the subsequent sub monitor, a first input terminal for transferring the control data from said host computer to said second buffering means, and a second input terminal for transferring the response data from the subsequent sub monitor to said fourth buffering means.

3. An apparatus for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 2, wherein said first buffering means includes:

a first resistor having its one side connected to an

output terminal of the corresponding microcomputer;

a second resistor having its one side connected to a ground voltage terminal;

a third resistor having its one side connected to said first output terminal of said connector;

a current amplification transistor having its base connected to the other side of said first resistor, its emitter connected to a supply voltage terminal and its collector connected in common to the other sides of said second and third resistors;

a first bias/transistor protection diode having its anode connected to a connection point of said one side of said third resistor and said first output terminal of said connector and its cathode connected to a connection point of said supply voltage terminal and said emitter of said transistor; and

a second bias/transistor protection diode having its anode connected to said ground voltage terminal and its cathode connected to said connection point of said one side of said third resistor and said first output terminal of said connector.

4. An apparatus for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 2, wherein said second buffering means includes:

a first resistor having its one side connected to a

supply voltage terminal;

a second resistor having its one side connected to said first input terminal of said connector;

a third resistor having its one side connected to a ground voltage terminal;

a current amplification transistor having its base connected in common to the other sides of said second and third resistors, its emitter connected to said ground voltage terminal and its collector connected in common to the other side of said first resistor and an input terminal of the corresponding microcomputer;

a first bias/transistor protection diode having its anode connected to a connection point of said first input terminal of said connector and said one side of said second resistor and its cathode connected to a connection point of said supply voltage terminal and said collector of said transistor; and

a second bias/transistor protection diode having its anode connected to said ground voltage terminal and its cathode connected to said connection point of said first input terminal of said connector and said one side of said second resistor.

5. An apparatus for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 2, wherein said third buffering means includes:

a first resistor having its one side connected to an output terminal of the corresponding microcomputer;

a second resistor having its one side connected to a ground voltage terminal;

a third resistor having its one side connected to said second output terminal of said connector;

a current amplification transistor having its base connected to the other side of said first resistor, its emitter connected to a supply voltage terminal and its collector connected in common to the other sides of said second and third resistors;

a first bias/transistor protection diode having its anode connected to a connection point of said one side of said third resistor and said second output terminal of said connector and its cathode connected to a connection point of said supply voltage terminal and said emitter of said transistor; and

a second bias/transistor protection diode having its anode connected to said ground voltage terminal and its cathode connected to said connection point of said one side of said third resistor and said second output terminal of said connector.

6. An apparatus for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 2, wherein said fourth buffering means includes:

a first resistor having its one side connected to a supply voltage terminal;

a second resistor having its one side connected to said second input terminal of said connector;

a third resistor having its one side connected to a ground voltage terminal;

a current amplification transistor having its base connected in common to the other sides of said second and third resistors, its emitter connected to said ground voltage terminal and its collector connected in common to the other side of said first resistor and an input terminal of the corresponding microcomputer;

a first bias/transistor protection diode having its anode connected to a connection point of said second input terminal of said connector and said one side of said second resistor and its cathode connected to a connection point of said supply voltage terminal and said collector of said transistor; and

a second bias/transistor protection diode having its anode connected to said ground voltage terminal and its cathode connected to said connection point of said second input terminal of said connector and said one side of said second resistor.

7. A method for controlling a plurality of sub monitors in a video communication system in which the same signal from

a host computer or a video tape recording/reproducing device is displayed on screens of said sub monitors and a main monitor to which said sub monitors are connected in series, comprising the steps of:

(a) checking states of said sub monitors on said screen of said main monitor and transferring control data from said host computer to a desired one of said sub monitors to control it; and

(b) selecting and setting up said desired sub monitor in response to the control data transferred at said step (a).

8. A method for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 7, wherein said step (a) includes the steps of:

(a-1) if said host computer is powered on, checking whether a sub monitor control key signal is inputted;

(a-2) automatically detecting arranged states of said sub monitors if it is checked at said step (a-1) that said sub monitor control key signal is inputted;

(a-3) displaying the arranged states of said sub monitors detected at said step (a-2) on said screen of said main monitor;

(a-4) selecting a desired one of said sub monitors displayed at said step (a-3);

(a-5) detecting data regarding various functions of said

selected sub monitor and displaying the detected data on said screen of said main monitor; and

(a-6) selecting a desired one of the functions of said selected sub monitor, varying a data value regarding the selected function and transferring the varied data value as the control data to said selected sub monitor through communication means.

9. A method for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 7, wherein said step (b) includes the steps of:

(b-1) allowing a first one of said sub monitors to receive the control data transferred at said step (a) and checking whether the received control data is for the control of said first sub monitor;

(b-2) checking whether the received control data is different from set-up data of said first sub monitor, if it is checked at said step (b-1) that the received control data is for the control of said first sub monitor;

(b-3) setting up said first sub monitor according to the received control data if it is checked at said step (b-2) that the received control data is different from the set-up data;

(b-4) checking whether another sub monitor to be controlled is present, after performing said step (b-3); and

(b-5) returning to said step (b-1) to select another sub

monitor, if it is checked at said step (b-4) that another sub monitor to be controlled is present.

10. A method for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 8, wherein said step (a) further includes the step of performing a general function if it is checked at said step (a-1) that said sub monitor control key signal is not inputted.

11. A method for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 9, wherein said step (b) further includes the step of transferring the control data from said host computer to a second one of said sub monitors if it is checked at said step (b-1) that the received control data is not for the control of said first sub monitor.

12. A method for controlling a plurality of sub monitors in a video communication system, as set forth in Claim 11, wherein said step (b) further includes the step of proceeding to said step (b-4) if it is checked at said step (b-2) that the received control data is not different from the set-up data.

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4T (TADX)

Int Cl (Ed.6): G06F 3/14, 3/147, 3/153; G09G 1/00, 1/16, 3/00, 5/00

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2291770 A (IBM)	
X	EP 0498995 A2 (PIONEER)	1,7
A	WO 93/06587 A1 (ICL)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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